

REMARKS

This application has been reviewed in light of the Office Action mailed on April 2, 2004. Claims 1-4 and 6 are pending in the application with Claims 1 and 6 being in independent form. By the present amendment, Claims 1 and 6 have been amended. No new matter or issues are believed to be introduced by the amendments.

Claim 1 has been objected to. Claim 1 has been amended in a manner which is believed to overcome the objection. Accordingly, withdrawal of the objection is respectfully requested.

Claims 1-4 and 6 were rejected under 35 U.S.C. §112, second paragraph. Claim 1 has been amended to better define Applicants' invention and to overcome the rejection. Claim 6 has been amended to place it in independent form. Accordingly, withdrawal of the rejection under 35 U.S.C. §112, second paragraph, with respect to Claims 1-4 and 6 is respectfully requested.

Claims 1-4 and 6 were rejected under 35 U.S.C. §103(a) over U.S. Patent No. 5,852,646 issued to Klotz et al. on December 22, 1998 ("Klotz et al.") in view of U.S. Patent No. 6,324,254 issued to Pflaum on November 27, 2001 ("Pflaum") and U.S. Patent No. 6,266,553 issued to Fluhrer et al. on July 24, 2001 ("Fluhrer et al.").

Applicants have amended Claims 1 and 6 to better define Applicants' invention and to overcome the rejection. Specifically, Claim 1 has been amended to recite "An X-ray imaging method comprising the steps of: forming a set of 2-dimensional X-ray images of an object of the coronary vascular system to be examined by means of a scan rotation of a single imaging device, i.e., an X-ray source, around said object over a run length, said X-ray images being acquired at predetermined characteristic time moments in a

cardiac cycle of the object; and reconstructing a 3-dimensional volume of the imaged object, wherein the run length of the scan rotation over substantially 180° is approximately 10° per second such that approximately 100 X-ray images corresponding to a quasi-stationary heart are obtained during the scan rotation.” (Emphasis added)

Similar language as that underlined for Claim 1 is recited by Claim 6.

Klotz et al., Pflaum and Fluhrer et al., taken alone or in combination, do not disclose or suggest the limitations recited by Applicants’ Claims 1 and 6. Klotz et al. describes an X-ray imaging device where a first and a second imaging device are used to image a patient. The images picked up by the first and second imaging devices are then used to form images which image the volume to be examined from different angular positions. (See column 4, lines 11-44).

Klotz et al. states that 100 images can then be formed by combining the two- and three-dimensional images picked up by the first and second imaging devices, respectively. (See column 4, lines 40-44) The 100 images are formed after the scan rotation by combining images picked up by the two imaging devices. Accordingly, it is believed that each imaging device picks up around 50 images such that a one-to-one combination of images from the two imaging devices would yield the 100 images. These 100 images, nonetheless, are not obtained during the scan rotation, as recited by Applicants’ Claims 1 and 6, but are formed by combining images after the scan rotation.

Further, Klotz et al. does not disclose or suggest at least using a single imaging device for acquiring X-ray images at predetermined characteristic time moments in a cardiac cycle of the object, as recited by Applicants’ Claims 1 and 6. Further still, Klotz

et al. does not disclose or suggest a run length of the scan rotation over substantially 180° being approximately 10° per second, as recited by Applicants' Claims 1 and 6.

Pflaum does not cure the deficiencies of Klotz et al. Pflaum states that the described X-ray device obtains about 400 images given an average heartbeat frequency of 60 beats per minute. (See column 4, lines 11-18) Pflaum states that the number of images can be **somewhat** higher or lower dependent on the heartbeat frequency of the patient. (See column 4, lines 16-18) Accordingly, Pflaum does not disclose or suggest obtaining approximately 100 X-ray images corresponding to a quasi-stationary heart during a scan rotation, as recited by Applicants' Claims 1 and 6.

Further, Pflaum does not disclose or suggest the limitation "wherein the run length of the scan rotation over substantially 180° is approximately 10° per second," as recited by Applicants' Claims 1 and 6. The Examiner specifically cites Pflaum at column 1, lines 45-50 for disclosing according to the Examiner "that angular velocity can be configured for higher rates based on the heart rate of a patient to be imaged (column 1, lines 45-50)." There is no such disclosure by Pflaum.

At column 1, lines 45-50, Pflaum states the following: "This object is achieved in accordance with the invention in a method and X-ray device wherein a number of digital X-ray images are picked-up during a slow motion of an X-ray pickup system of an X-ray device, this slow motion ensuing along an orbit with an angular velocity smaller than 6° per second...." (Emphasis added) Accordingly, the disclosed angular velocity is not approximately 10° per second as recited by Applicants' Claims 1 and 6.

Pflaum further states at column 2, lines 17-24 the following: "The movements of the X-ray image pickup system can advantageously ensue with an angular velocity <2°

per second, particularly with 0.50[°] per second, and the speed of movement of the X-ray image pickup system can be selected dependent on the frequency of movement of the acquired vessel motions and organ motions, i.e. the angular velocity with which the image pick-up system moves can definitely be selected all the higher, the higher the heart frequency is.” (Emphasis added) The angular velocity disclosed in this paragraph is also not approximately 10° per second as recited by Applicants’ Claims 1 and 6. Even though this paragraph states that the angular velocity can be selected “all the higher,” Pflaum does not disclose or suggest an angular velocity approximately 10° per second as recited by Applicants’ Claims 1 and 6. At best, Pflaum discloses an angular velocity of “smaller than 6° per second.” (See column 1, lines 49-50) Accordingly, Pflaum does not disclose Applicants’ features as recited by Applicants’ Claims 1 and 6 and also does not cure the deficiencies of Klotz et al.

Fluhrer et al. does not cure the deficiencies of either Klotz et al. and Pflaum. Fluhrer et al. discloses obtaining a dataset completely within each of a number of successive time intervals δt then combining the datasets from the successive time intervals δt to produce a low-motion image of the heart. See column 1, line 64 to column 2, line 14 and column 3, lines 12-27. There is no disclosure or suggestion of at least the feature of a run length of the scan rotation over substantially 180° being approximately 10° per second such that approximately 100 X-ray images corresponding to a quasi-stationary heart are obtained during the scan rotation, as recited by Applicants’ Claims 1 and 6. Accordingly, Fluhrer et al. does not disclose Applicants’ features as recited by Applicants’ Claims 1 and 6 and also does not cure the deficiencies of Klotz et al. and Pflaum.

Accordingly, withdrawal of the rejection with respect to Claims 1 and 6 and allowance thereof are respectfully requested. Claims 2-4 depend from Claim 1 and therefore include the limitations of Claim 1. Therefore, for at least the same reasons given above for Claim 1, Claims 2-4 are believed to be allowable over the cited references, taken alone or in combination. Accordingly, withdrawal of the rejection with respect to Claims 2-4 and allowance thereof are respectfully requested.

In view of the foregoing amendments and remarks, it is respectfully submitted that all claims presently pending in the application, namely, Claims 1-4 and 6, are believed to be in condition for allowance and patentably distinguishable over the art of record.

If the Examiner should have any questions concerning this communication or feels that an interview would be helpful, the Examiner is requested to call John Vodopia, Esq., Intellectual Property Counsel, Philips Electronics North America, at 914-333-9627.

Respectfully submitted,



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